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Implementing ERP Information Systems using SAP

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1. Overview Research Project

Lucent Technologies (LT) faces competitive threats more than ever before and is hampered by inefficient and costly internal systems and processes. To streamline operations and to create a high performance operating environment, LT is planning to support all its business functions worldwide with SAP. The objectives of this research project are to provide a better understanding of SAP's proposed implementation method for its integrated software package, and to assure an effective support of the business processes at LT.

Section 2 will discuss some important concepts like Enterprise Resources planning, SAP R/3 and Business Process Re-engineering. The information systems engineering process and implementation method of SAP is discussed in section 3, applying the five ways of Wijers (1989):

- The way of thinking depends on the philosophy used to look at organizations and information systems;
- The way of modeling describes the products to be delivered;
- The way of working encompasses the activities to adapt an information system (how to do the project);
- The way of controlling addresses the management process to control information systems engineering (how to manage the project);
- The way of supporting describes the tools to be used to facilitate the specification of models and products;

Furthermore, section 3 discusses the crucial assumptions of the SAP implementation method. The most important one is that an enterprise should accept the embedded 'best practices' in SAP R/3 wherever possible. This implies using the Reference Process Model Approach. The risks and problems to overcome when implementing SAP R/3 will be discussed by evaluating the influence of the Reference Process Model Approach on seventeen *contingency factors* based on Van Slooten et. al. (1996):

- *Management commitment.* To what extent management supports the project
- *Importance.* To what extent the project or information system is important for the organization
- *Impact.* To what extent business operation will change after implementation
- *Resistance and Conflict.* To what extent stakeholders have different or conflicting interests
- *Time Pressure.* To what extent the available time for the project is experienced as insufficient

- *Shortage of Human Resources.* To what extent the number of people available for the project is experienced as insufficient
- *Shortage of Means.* To what extent the means available for the project are experienced as insufficient
- *Formality.* To what extent there are lasting rules, procedures, and standards for the business processes and supporting information
- *Knowledge and Experience.* To what extent the users possess enough knowledge and experience to develop the required information system
- *Skills.* To what extent the members of the project-team have enough knowledge and experience to develop the required information system
- *Size.* The number of people being a member of the project-team
- *Relationships.* To what extent there are relationships between the new information system and other information systems
- *Dependency.* To what extent the project depends on activities and conditions outside the project
- *Clarity.* To what extent the goals, needs, and desires of the users are clear, coherent, and consistent enabling a sound specification of the requirements
- *Stability.* To what extent the goals, needs, and desires of the users will not change over time enabling a stable specification of the requirements
- *Complexity.* To what extent the functional components of the information system are complex
- *Level of Innovation.* To what extent the applied technology and/or the applied methods, techniques, and tools are new to the organization

In section 4 suggestions for a Situational Specific Approach are made for LT in the form of recommendations in terms of the seventeen contingency factors.

2. ERP, SAP R/3 and LT

Enterprise Resource Planning

Enterprise Resource Planning (ERP) is an integrated, multi-dimensional system for all functions, based on a business model for planning, control, and global (resource) optimization of the entire supply chain, by using state of the art IS/IT technology that supplies value added services to all internal and external parties (Deschoolmeester, 1997). ERP is the first concept that integrally encompasses business management and information technology. A number of aspects play an

important role, such as the functional, the automation or IT aspects, but also the implementation aspects of the ERP system. An ERP package can be used as an enabler for BPR-projects. According to Hammer et al. (1993), BPR means fundamentally rethinking and radically redesigning business processes to achieve major improvements in critical performance indicators, like costs, quality, service, and lead time. This can only be done if the reorientation of processes and resources are done before the actual implementation of the ERP package.

SAP R/3

The integrated business process software of SAP R/3 covers financials, accounting and control, sales and distribution, production and materials management, quality management and plant maintenance, human resources and project management. In addition, information systems automatically summarize operational data into executive information: decision support for controlling critical success factors at all levels of the business. The main common reasons of all projects to implement SAP are:

- Re-tooling the common functions to improve the quality of information and cut costs.
- Improving current operating structure (meeting customer needs by improving responsiveness and speeding up time-to-market).
- Replacing outdated systems and processes.
- Improving data integrity and availability.

LT and SAP R/3

LT is attacking the operational overhead of its internal systems at the same time as trying to reengineer and integrate the business. Here lies the problem: the projects set their priorities differently and consequently are different in character. An ERP package can only be used as an enabler for BPR-projects. This means that the reorientation of common processes and resources need to be done before the actual implementation, the result is a destabilized organizational structure. One of the critical success factors of a smooth and rapid ERP implementation is a stable, mature and capable organization (Deschoolmeester, 1997). Some of the problems regarding scope creep (regarding time and/or functionality) could have been avoided when a detailed conceptual model had been designed before implementation (business blueprint). A convenient way to do this is to use a Reference Model avoiding the modeling effort to start from scratch.

3. Implementing SAP R/3

The SAP R/3 implementation method

SAP's proposed way of implementing its software seems to be a very sound method in terms of Wijers

Framework for Understanding (Wijers et al., 1989). All aspects of the 'Five Ways' are carefully considered. The Way of Thinking (creating and using a business blue print) strongly influences the Way of Modeling, the Way of Working, the Way of Controlling and the Way of Supporting. SAP's philosophy is based on the notion that the purpose of modeling is to reduce risks of implementing the SAP R/3 system by improving the communication, documentation, understanding and verification of the design process. It should ease the transition to 'Going Live' and can keep track of continuous business engineering efforts. This is done by creating a common frame of reference (the business blueprint) using the SAP R/3 Reference Model as baseline. Implementation teams should use standard SAP Event-driven Process chains (EPC) as basis for all process modeling activities. It also assures consistent and structured specification of process requirements. The R/3 Reference Process Model also represents the architecture of the SAP R/3 information system as defined by Zachman (Zachman, 1987).

Crucial assumptions

The following five crucial assumptions are listed related to the aspects of the SAP R/3 method (Way) it influences:

- Business process modeling is done before the actual system implementation (business blue print). Way of working and way of controlling.
- The business blue print is constructed using the R/3 Reference Model Approach. Way of working.
- The enterprise is willing to accept most of the R/3 Reference Model processes wherever possible (At least 80%: 80-20 rule). Way of thinking.
- Business processes are modeled using EPC's in order to customize SAP R/3. Way of modeling.
- An automated tool is used to support the construction and maintenance of the business blue print. Way of supporting.

The first crucial assumption of the SAP R/3 implementation method is that business process modeling is done before the actual implementation. The second crucial assumption of the SAP R/3 method is the use of the R/3 Reference Model to construct the business blue print. This means that best results will come when business is changed to fit the package and not vice versa. If the belief of the senior management of a company is that the vast majority of processes must be proprietary, then standard enterprise software, like SAP R/3, is not likely to be an effective choice. Since the R/3 Reference Model is written in the EPC language, enterprises using the SAP system are forced to model their business processes using EPC's in order to customize SAP R/3 (Keller, 1995). Considering the complexity and scope of a SAP implementation, the use of an automated tool to support EPC modeling is evident.

Risks and problems

Because it is assumed that the R/3 Reference Model written in the EPC language is used to construct the business blue print, the most important risks and problems to overcome may be specified, based on situational factors as defined by Van Slooten (1996), as follows:

- Lack of *management commitment* to use the R/3 Reference Model and accept the embedded best practices in SAP R/3 wherever possible.
- Great *impact* SAP R/3 has on business operations after implementation.
- *Resistance and Conflict* to use the R/3 Reference Model and accept the embedded best practices in SAP R/3 wherever possible.
- *Shortage of human resources* with SAP experience, knowledge, and expertise.
- High degree of *formality* applying the rules, procedures, and standards for the business processes and supporting information when applying the SAP R/3 implementation method, like the EPC language.
- Lack of *knowledge, experience, and skills* of SAP R/3 and the high *level of innovation* of the methods, techniques, and tools.
- Large *size and complexity* of the project.
- Lack of *clarity and stability* (to what extent the goals, needs, and desires of the users are clear and coherent enabling a sound specification of the functional requirements).

4. Application and Evaluation at Lucent

Here we want to present the results of evaluating Lucent's approach. We now can see how the situational specific *contingency factors* of (Slooten, 96) can be influenced positively by the SAP implementation method. An evaluation of the contingency factors has been made, applied to the five ways of (Wijers, 1989). From this evaluation recommendations in the form of Key Success Factors (KSF) are proposed for Lucent regarding the implementation of SAP/R3:

Way of Thinking

Opportunities: management commitment, importance, impact; reduced complexity, few relationships, low dependency; stability, innovation.

Threats: resistance and conflict, time pressure.

KSF:

- Establish management commitment to use R/3 Reference Model
- Define Business Blueprint (common frame of reference based on Reference Model)
- Make use of consultants on strategic level

Way of Modeling

Opportunities: formality, clarity, innovation.

Threats: resistance and conflict, time pressure; lack of knowledge, experience and skills; large size, few relationships, low dependency, complexity.

KSF:

- Use Reference Model and EPC method to define Business Blueprint (detailed common frame of reference)
- Use free models to communicate with users
- Set goals in realistic time-frame

Way of Working

Opportunities: formality, clarity.

Threats: shortage of human resources and means, lack of knowledge and experience, skills; large size, complexity.

KSF:

- Make use of six sequential ASAP phases and its tools
- Make use of experienced consultants

Way of Controlling

Opportunities: formality, clarity; few relationships, low dependency.

Threats: large size, complexity, time pressure, shortage of means.

KSF:

- Make use of Business Blueprint and SAP guidelines.

Way of Supporting

Opportunities: formality, clarity; innovation.

Threats: shortage of human resources and of means, lack of management commitment; large size, complexity, time pressure.

KSF:

- Use automated tools (Business Engineer, LiveModel, ASAP) and commit to it early

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